

Implementation of Minimum Antenatal Care Service Standards in North Lampung Regency

Lisa Suarni^{1*}, Kodri¹, Warjidin Aliyanto², Hasti Primadila¹, Fajar Desma Wahyudi¹

¹Nursing Department, Poltekkes Kemenkes Tanjung Karang, Bandar Lampung, Indonesia

²Midwifery Department, Poltekkes Kemenkes Tanjung Karang, Bandar Lampung, Indonesia

ARTICLE INFO

ABSTRACT

Article history

Received date
21 Mar 2024

Revised date
22 Apr 2024

Accepted date
25 Apr 2024

Keywords:

Antenatal Care;
Maternal Mortality Rate;
Minimum Service
Standards (MSS).

Maternal Mortality Rate (MMR) in North Lampung is high. Coverage of antenatal care visits in 2021 (88.7%) has yet to reach the target (100%), even though the number of midwives and integrated health post (Posyandu) services increases every year. The Minimum Service Standard report also indicates that the budget for maternal care services is around 17% of the total budget allocation. This study aims to provide an overview of the implementation of the 10 Antenatal Care (ANC) services in North Lampung. The research design employs a quantitative method with a documentation study using Maternal and Child Health (MCH) books and questionnaires to measure midwives' knowledge in North Lampung. The sample size was determined using the open-source calculator SSPropor (OpenEpi, version 3), resulting in 595 collected samples for this study. Data were analyzed using univariate and bivariate analyses. None (0%) of the pregnant women received all 10 ANC services. Almost all pregnant women (>90%) received blood pressure examinations, counseling, and referral services. Meanwhile, the ANC service received least frequently (<50%) was the provision of Iron and Folic Acid (IFA) tablets. There is a significant difference in the mean coverage based on the three clusters, and there is a weak relationship between Midwives' Knowledge and the implementation of 10 ANC services. Recommendations: There is a need for programs to comprehensively improve knowledge about ANC standards among health workers and volunteers. Discipline in recording needs to be enhanced. Further qualitative studies are required to gain a broader perspective.

Corresponding author:

Lisa Suarni

Nursing Department, Poltekkes Kemenkes Tanjung Karang, Bandar Lampung, Indonesia

Email: lisakausar@yahoo.co.id

INTRODUCTION

The maternal mortality rate was alarmingly high, with an estimated 287,000 women dying during and after childbirth in 2020. Nearly 95% of these maternal deaths occurred in low and middle income countries. Regrettably, these deaths were largely preventable (World Health Organization, 2024). According to the Maternal Perinatal Death Notification (MPDN) system of the Indonesian Ministry of Health, the number of maternal deaths reached 4,005 in 2022 and increased to 4,129 in 2023 (Redaksi Mediakom, 2024).

Antenatal care visits for pregnant women in North Lampung District fluctuated from 2017 to 2021. The highest was recorded in 2017 (90.6%), while the lowest was in 2020 (86%), with a subsequent increase in 2021 (88.7%). These percentages are still below the 100% antenatal care coverage target in 2021. The maternal mortality rate in North Lampung tends to increase annually from 2017 to 2021. The highest number

of maternal deaths occurred in 2021, with 12 deaths (117/100,000 live births). These maternal deaths resulted from 1 case of hemorrhage, 4 cases of hypertension, and seven other causes. Maternal mortality rates and antenatal care coverage in North Lampung have not yet reached their targets. Conversely, the number of midwives and integrated health post (Posyandu) services increases yearly. The Minimum Service Standard report also indicates that the budget allocated for maternal care services is approximately 17% of the total budget (North Lampung Health Office, 2022).

Indonesia endeavors to reduce maternal mortality through Minister of Health Regulation No. 4 of 2019 on Minimal Service Standards in Health. Health services for pregnant women, including ANC, should be conducted at least four times: once in the first trimester, once in the second trimester, and twice in the third trimester. ANC should be provided according to Midwifery Service Standards by professional health workers,

including obstetricians, general practitioners, midwives, and nurses. The quality standard for ANC includes the 10 Antenatal Care (ANC) components, namely: 1) Height and weight measurement; 2) Blood pressure measurement; 3) Upper Arm Circumference (UAC) measurement; 4) Measurement of uterine fundal height; 5) Determination of fetal presentation and fetal heart rate (FHR); 6) Immunization administration according to immunization status; 7) Provision of iron and folic acid tablets, a minimum of 90 tablets; 8) Laboratory tests; 9) Case management; and 10) Counseling sessions (Ministry of Health RI, 2019).

However, evaluating how these minimum service standards are implemented in each health facility, including in urban and rural areas with easy and remote access, and assessing the knowledge of midwives responsible for implementing these 10 ANC components at the basic service level, as well as determining if there is a relationship between midwives' knowledge and the implementation of 10 ANC, is necessary.

This research aims to understand how the 10 ANC components are applied in ANC services for pregnant women and the relationship between midwives' knowledge and the implementation of 10 ANC according to the standard in North Lampung District.

METHOD

This study utilizes a descriptive research design with a quantitative retrospective approach. Data collection involves documentation study of Maternal and Child Health (MCH) books belonging to pregnant women who have given birth (with children aged 0-1 year) in selected primary health care centers (PHCs) based on the following groups: 1) urban; 2) rural areas with close proximity; and 3) rural areas with distant proximity.

The population in this study consists of pregnant women who underwent pregnancy and childbirth in 2023 in North Lampung Regency. The sample for this study is drawn from the population with the inclusion criteria: 1) Willingness to participate in the study, 2) Possession of the MCH book, and 3) Gave birth no more than one year ago at the time of data collection. Exclusion criteria include: 1) Incomplete or unclear record of services in the MCH book, for instance, when the amount of iron (Fe) cannot be determined. The population is calculated based on the number of reported childbirths in the Health Office from January to

August 2023, totaling 5,624 individuals. The collected sample size is 595, thus meeting a confidence level of 99%.

Sampling is conducted using multistage sampling. In the first stage, 27 PHCs are divided into 3 clusters representing the characteristics of urban, rural areas with close proximity, and rural areas with distant proximity. The number of PHCs used is 10. In the second stage, samples are proportionally taken from each PHC selected for the study. The sample of midwives is determined based on the selected PHCs and meets the inclusion criteria: 1) Willingness to participate in the research; 2) Providing delivery services in North Lampung Regency.

Exclusion criteria include 1) Refusal to participate in the research as evidenced by not completing the questionnaire. The questionnaire is distributed using online survey tools through the midwife coordinator or PHC head. The obtained sample size of midwives is 153. Variables in this study include the dependent variable, implementing 10 Antenatal Care (ANC) services, and independent variables, such as midwives' knowledge and health facility accessibility.

The researchers observe service documentation and assess the implementation of 10 ANC services using a checklist sheet referring to the integrated ANC implementation guidelines. A questionnaire is used to assess knowledge and health facility accessibility. The questionnaire has undergone validity testing with a critical value of 0.159 at a significant level of 5%, with degrees of freedom (df) of 150. Thus, all questions with values >0.159 are considered valid. Reliability testing shows an alpha value $>$ critical value, i.e., $0.949 > 0.159$, indicating that all questions are reliable.

An analysis in this study includes descriptive analysis, frequency distribution of 10 ANC services, knowledge, and health facility accessibility based on clusters. Bivariate analysis utilizes Pearson Correlation Analysis to analyze the relationship between midwives' knowledge and the implementation of 10 ANC services. ANOVA is used to determine the relationship between the cluster of service accessibility and the implementation of 10 ANC services. Further analysis (Post Hoc Test) to identify differing groups among the regional clusters uses the Bonferroni test due to the homogeneity test indicating equal variance.

Ethical clearance is obtained based on an ethical clearance certificate issued by the Ethics Commission of the Health Polytechnic of Tanjungkarang Ministry of Health, with reference number 411/KEPK-TJK/VII/2023.

RESULTS

North Lampung Regency has 27 PHCs spread across all districts. There are 4 PHCs located in urban areas, while the rest are in rural areas. However, some PHCs with rural characteristics have demographic and geographic characteristics similar to urban areas. In this regard, the researchers made some adjustments to the data groups.

The North Lampung Regency Health Office has implemented an Information System to measure National Quality Indicators. In this application, PHCs report the implementation of Minimal Service Standards (MSS) in the health sector, including ANC services, using the 10 ANC services approach. This information system can generate data on the achievement of 10 ANC services, but according to PHCs staff, not all data are input into the National Quality Indicator (INM). In addition, midwives also input data into the e-cohort application to record maternal data. The utilization of this application could be more optimal due to signal constraints and limited technology proficiency.

Despite the availability of electronic information systems, recording in the Maternal and Child Health (MCH) book continues. The MCH book is used to communicate between staff, pregnant women, and their families. Observations show a lack of discipline in filling out the MCH book; for example, the number of iron tablets given to and consumed by the mother is not recorded. This also needs to be improved in this research, which is used to assess whether the services provided meet the standards. Errors were also found, including some entries in columns only marked with ticks instead of examination results. It was also found that examination results were not written in the provided table but elsewhere.

The MCH books used are not uniform; some use old versions, and some use new versions. According to some midwives, the new version is less user-friendly because it lacks communication, has limited columns, and does not comply with the new policies. They also encountered difficulties when pregnant women's visits exceeded the specified standard and during the sick visits as well. Filling out the MCH book is not only done by midwives providing ANC services but also by other health workers such as doctors and obstetricians. Midwives have an average age of

37.13 years, with a minimum age of 23 years, a maximum of 58 years, and a standard deviation of 8.34. The most common education level among midwives is basic midwifery education, predominantly vocational education.

The average age of pregnant women is 29.40 years, ranging from a minimum of 15 years to a maximum of 48 years (95% CI: 28.92-29.87), with a standard deviation of 5.85 years.

Table 1. Midwives' education level

Education level	n	%
Associate	89	56.0
Applied science	63	39.6
Bachelors	6	3.8
Masters	1	0.6

The data presented in Tables 2 and 3 indicates that the respondents are predominantly pregnant women with a senior high school/vocational school education level, housewives, and residing in rural areas with close proximity access.

Table 2. Pregnant women characteristics

Characteristics		n	%
Education level	Elementary	67	11.3
	Junior high school	146	24.5
	Senior high school/ vocational school	334	56.1
	Associate degree	13	2.2
	Applied Science	2	0.3
Occupation	Bachelor	33	5.5
	Blue collar	2	0.3
	Housewife	545	91.6
	Private employee	22	3.7
	Education staff	12	2.0
	Farmer	6	1.0
	Healthcare personnel	4	0.7
Business Woman	4	0.7	

Table 3. Pregnant women residency area

		n	%
Area	Remote	183	30.8
	Close proximity rural	254	42.7
	Urban Area	158	26.6

Table 4 shows that no pregnant women (0%) received all 10 ANC services completely. The 10 ANC services received by almost all pregnant women (>90%) were blood pressure examination, counseling, and referral services. Meanwhile, the 10 ANC services that was least received (<50%) was the provision of iron supplementation tablets.

Table 4. The 10 ANC services implementation

	10 ANC Services		n	%
1. Height and weight measurements: Height must be measured at least once, and weight should be measured at every visit	No	195	32.8	
	Yes	400	67.2	
2. Blood pressure measurement: Blood pressure should be measured at each visit	No	13	2.2	
	Yes	582	97.8	
3. Initial assessment of fetal heart rate: Fetal heart rate assessment is minimal during the first visit	No	251	42.2	
	Yes	344	57.8	
4. Fundal height measurement: Fundal height measurement should commence at 25 weeks of gestation	No	184	30.9	
	Yes	411	69.1	
5. Evaluation of fetal presentation and fetal heart rate: Fetal presentation and fetal heart rate should be examined at every visit	No	163	27.4	
	Yes	422	70.9	
6. Administration of iron and folic acid supplements: A minimum of 90 tablets of iron and folic acid should be provided	No	378	63.5	
	Yes	196	32.9	
7. Minimum laboratory examinations: Hemoglobin (Hb), glucose, and urine protein should be tested at least once	No	96	16.1	
	Yes	499	83.9	
8. Immunization administration according to immunization status	No	118	19.8	
	Yes	477	80.2	
9. Counseling provision at every visit according to identified issues	No	9	1.5	
	Yes	586	98.5	
10. Referral initiation when necessary	No	9	1.5	
	Yes	586	98.5	

Table 5. Pearson correlation analysis of midwives knowledge and 10 ANC services implementation

		Knowledge	Implementation
Knowledge	Pearson Correlation	1	.103*
	Sig.(2-tailed)		.012
	N	595	595
Implementation	Pearson Correlation	.103*	1
	Sig.(2-tailed)	.012	
	N	595	595

*Correlation is significant at the 0,01 level (2-tailed)

Table 5 show that the significance value (p-value) is 0.012 (<0.05). It can be concluded there is a correlation between midwives' knowledge and the implementation of 10 ANC services, but the strength of the relationship is weak (Jr=0.103).

Table 6. Variance homogeneity of healthcare facilities accesses

Levine Statistic	.df1	.def2	Sig.
35,79	2	592	0,000

The variance of the three groups in Table 6 is the same (p-value=0.000). The ANOVA test is valid for examining the relationship between facility access and the implementation of 10 ANC services.

Table 7. ANOVA Test

No. of 10 ANCs	Sum of Squares	df	Mean Square	F	Sig.
between groups	37.970	2	18.985	11.515	.000
within groups	976.023	592	1.649		
Total	1013.993	594			

Table 7 shows that the p-value is 0.000. Therefore, at the significance level of 0.05, Ho is rejected, leading to the conclusion that there is a significant difference in the average access based on the three access groups.

Table 8. Differences of 10 ANC implementation among the groups

Variable	Mean	SD	95%CI	P-value
Rural: Remote access	7.8470	1.44822	7.6358 - 8.0582	.0005
Rural: Close access	7.6063	1.38117	7.4356- 7.7770	
Urban	7.1835	.84340	7.0510- 7.3161	

At an alpha of 5%, it can be concluded that there are differences in implementing 10 ANC services among the urban, remote, and close access area groups. Further analysis proves that the significantly different groups are between the urban area and remote access rural, as well as between the urban area and close access rural.

DISCUSSION

The findings of this study illustrate the lack of discipline among healthcare workers in recording information in the Maternal and Child Health Handbook (MCH Book). However, one of the functions of the MCH Book is to serve as a communication tool among healthcare workers and to monitor the health progress of pregnant women, fetuses, infants, and children as the basis for healthcare interventions. Several studies on the implementation of the MCH Book indicate that its utilization is not optimal (Ulfa et al., 2021; Arifin, 2017).

During the Knowledge Sharing Program (KSP) on Maternal and Child Health Handbook in September 2022 in Bogor, Indonesia, Senior Representative Okamura Kenji stated that the Japan International Cooperation Agency (JICA) shares the same concern about strengthening maternal and child care and ensuring the quality of maternal and child healthcare services. JICA strives to ensure quality care by detecting all public health issues early using the MCH Book (Japan International Cooperation Agency, 2022).

This study (Table 2) shows that the majority (91,9%) of respondents are pregnant women with lower secondary education (Elementary: 11,3%, Junior High school: 24,5%, and Senior High School: 56,1%) and housewives (91.6%). The utilization of the MCH Book depends on several factors, including the reading ability of pregnant women and families. A study conducted in Bulgan Province, Mongolia, with 716 respondents, found that 631 (88.1%) read the MCH Book and 428 (59.8%) recorded health-related information in it (Hikita et al., 2018). Higher maternal education levels increase the likelihood of reading and writing in the MCH Book (Hikita et al., 2018).

The 10 ANC services implementation

According to the Minister of Health Regulation No. 4 of 2019 concerning Technical Standards for the Fulfillment of Basic Service Quality in the Minimum Service Standards in the Health Sector, antenatal care services should be provided at a minimum of 4 times during pregnancy, with one visit in the first trimester, one in the second trimester, and two in the third trimester. The services are conducted by midwives, doctors, or obstetricians with a Register Certificate working in government or private healthcare facilities. The quality standard of antenatal care involves fulfilling the 10 ANC services criteria, including (1) Measurement of height and weight; (2) Blood pressure measurement; (3) Measurement

of Upper Arm Circumference (LILA); (4) Measurement of uterine fundal height; (5) Determination of fetal presentation and Fetal Heart Rate (DJJ); (6) Immunization according to immunization status; (7) Provision of iron supplementation with a minimum of 90 tablets; (8) Laboratory tests; (9) Case management; (10) Counseling sessions (Ministry of Health RI, 2019).

The results of this research (Table 4) indicate that 32.8% of pregnant women did not undergo height and weight measurements. The standard for quality Antenatal Care requires pregnant women to undergo weight measurements every time they receive ANC. Weight measurement aims to indicate fetal growth disturbances. The height of pregnant women is crucial to estimating pelvic size, which is known to ensure whether childbirth can proceed normally or not.

The USA Institute of Medicine (IOM) recommends that women with healthy pre-pregnancy BMI, overweight, and obese should gain weight between 11.5–16kg, 7–11.5kg, and 5–9kg, respectively. Although some countries monitor pregnant women to assess whether their weight gain is appropriate, many countries do not monitor them, including the UK. There is a relationship between weight gain during pregnancy and the impact on preterm birth, total birth weight, low birth weight (<2,500g), macrosomia, large for gestational age (LGA) babies, and small for gestational age (SGA) babies. There is also a relationship between cesarean section and medium-term weight retention (3 months to 3 years postpartum), and women who are obese before pregnancy have a higher risk of undergoing cesarean section compared to women with normal weight (Eloranta et al., 2023).

The research results (Table 4) show that almost all pregnant women had their blood pressure measured, but still, 2.2% of pregnant women did not undergo it. Measuring blood pressure in pregnant women is important because pregnant women should not have excessively high or low blood pressure. High blood pressure during pregnancy can trigger pre-eclampsia (Fauvel, 2016), while too low blood pressure can potentially lead to Sheehan's syndrome (Shivaprasad, 2011). Hypertensive disorders during pregnancy, postpartum hemorrhage, anemia, thrombocytopenia, hepatopathy, and cardiopathy are the leading causes of near-miss events in pregnant women (Yang et al., 2018). Regular blood pressure (BP) measurement is essential for diagnosing and managing hypertension disorders during pregnancy, such as pre-eclampsia, and making medical decisions that

impact both the mother and the fetus (Ashworth et al., 2020; Bello et al., 2018).

Hypertensive disorders in pregnancy (HDP) frequently occur, with pre-eclampsia complicating 2% to 3% of pregnancies, pre-existing hypertension complicating 1% of pregnancies, and isolated gestational hypertension complicating 5% to 6% of pregnancies (Hutcheon et al., 2011). HDP is a significant cause of maternal and perinatal morbidity and mortality, particularly in low- and middle-income countries (National Institute for Health and Care Excellence, 2019).

As many as 42.2% of pregnant women did not undergo an Upper Arm Circumference (UAC) examination, yet this is crucial for pregnant women. UAC measurement aims to determine the nutritional status of pregnant women. Pregnancy places women at higher risk of malnutrition due to increased nutritional needs, leading to micronutrient and macronutrient deficiencies if dietary intake is not improved. Malnutrition during pregnancy not only harms maternal health but also affects fetal and neonatal health (Kpewou et al., 2020).

The study found (table 4) that 63.5% of pregnant women were not given Iron Supplementation Tablets (IST), the provision of which prevents anemia in pregnant women. Mutiara et al.'s literature review states that IST provision in several primary health centers in Indonesia has not been well-implemented (Mutiara et al., 2023). Yet, there is a correlation between the history of IST received and consumed with the occurrence of anemia (Mariyam & Muslimah, 2018). Anemia in pregnant women is a significant health problem and a priority program in Indonesia. Iron Supplementation Tablet (IST) supplementation is a cost-effective intervention that significantly reduces the prevalence of anemia in pregnant women. Non-compliance and lack of knowledge about the importance of regularly consuming IST are obstacles in the anemia-free pregnancy program (Bakhtiar et al., 2021).

Anemia risk assessment is performed through hemoglobin (Hb) examination for all pregnant women. Pregnant women are at risk of anemia. The incidence of anemia or blood deficiency in pregnant women in Indonesia is still relatively high, at 48.9% (Ministry of Health RI, 2019). This condition indicates that anemia is relatively high in Indonesia and approximates a severe public health problem with a prevalence threshold of more than 40% (Kusumastuti, 2022).

Basic Health Research 2018 results show that out of the coverage of iron supplementation tablet provision for pregnant women in 2018, 38.1% of pregnant women received a minimum of

90 iron tablets, and 61.9% received less than 90 iron tablets. As a government effort to accelerate the reduction of anemia cases during pregnancy, providing 90 iron supplementation tablets (Fe³) is imperative as one of the components of the ANC services. Regulation of the Minister of Health of the Republic of Indonesia number 88 of 2014 explains the 70 tablets of iron supplementation program aims to address iron consumption deficiencies. In response to the regulation, the government implements a blood supplementation program for every pregnant woman of 90 tablets during pregnancy because pregnant women are at risk of experiencing anemia.

As many as 30.9% of pregnant women did not undergo fundal height examination, and 27.4% (table 4) did not undergo presentation and Fetal Heart Rate (FHR) examination. Fundal height examination aims to estimate fetal body size, fetal growth rate, and fetal position in the uterus entering the second trimester of pregnancy (Ducarme et al., 2012). Fundal height can serve as a clinical indicator along with other clinical findings, providing information about medical conditions and previous obstetric history. However, fundal height has a high false negative rate for Small Gestational Age (SGA) (Pay et al., 2015).

Fetal heart rate (FHR) is an indicator that signifies life within a mother's womb. Several examinations are conducted to assess the fetus's health in the womb, and the fetal heart rate can typically be detected around the 11th week of gestation. Examination of presentation and FHR is crucial for monitoring and assessing the fetal condition during pregnancy and childbirth. Current fetal monitoring is based on the monitoring of fetal heart mechanical activity through Doppler ultrasound techniques (Kupka et al., 2020). FHR examination using Doppler involves recording FHR signals against uterine contractile activity and fetal movements (Horoba et al., 2016). A normal fetal heart rate indicates adequate fetal oxygenation and good central nervous system function (Kording et al., 2015).

As many as 16.1% of pregnant women did not undergo Hb, glucose, and urine protein examinations (table 4), which are essential for detecting anemia, diabetes, and pre-eclampsia. These conditions often occur in pregnant women. Gestational diabetes mellitus (GDM) affects around 6% of pregnant women, and its prevalence increases with the obesity epidemic. (Mack & Tomich, 2017). Similarly, pre-eclampsia is the leading cause of death in Lampung Province, accounting for 26% of all deaths, followed by hemorrhage at 25%. North Lampung Regency's Maternal Mortality Rate ranks fifth out of fifteen

regencies and cities in Lampung Province (Lampung Provincial Health Office, 2023).

Urine protein examination is a key finding to diagnose pre-eclampsia. There is a significant urine protein (proteinuria) increase in women with pre-eclampsia, and the increase is directly proportional to the severity of pre-eclampsia. In severe pre-eclampsia, there is a very high proteinuria level (Schiff et al., 1995).

Overall, this research indicates that ANC services in North Lampung do not meet the Minimum Service Standards (MSS) mandated in Minister of Health Regulation No. 4 of 2019, which includes the 10 Essential Antenatal Care (ANC) elements. Several studies evaluating implementing the 10 ANC Services program in various regions of Indonesia have shown results consistent with this research. For example, a study conducted in 3 PHCs in Blitar City found that policy actors still have a minimal role in bridging integrated ANC services (Mikrajab et al., 2016). Additionally, research conducted in Independent Midwifery Practices (IMPs) showed that while IMPs have implemented the 10 ANC services, there are still some elements of the 10 ANC services that are not provided for pregnant women due to differences in the number of visits (V1-V4) by respondents (Supiana, 2021).

The relationship between midwives' knowledge and 10 ANC services

The research results show a relationship between midwives' knowledge and the provision of 10 ANC services, but this relationship tends to be weak. According to L. Green's theory, the determinants of an individual's health prevention behavior are influenced by three factors: predisposing factors such as knowledge, attitudes, beliefs, values, and traditions; enabling factors such as health facilities and infrastructure; and reinforcing factors such as support from healthcare providers and husbands (Carl et al., 2017).

Qualitative research conducted in rural areas of Laos shows that the quality of ANC services in rural health facilities is poor due to a lack of resources, limited skills of healthcare providers, inadequate routines, and lack of support from superiors (Manithip et al., 2013). A health survey conducted in India shows that only a small proportion of pregnant women utilize ANC facilities because of inadequate quality of ANC services, and most of them have suboptimal pregnancy conditions (Girotra et al., 2023).

In contrast to the research mentioned earlier, the coverage of ANC in Uganda is relatively high, and most pregnant women receive advice to deliver

at healthcare facilities. Despite those conditions, the coverage of deliveries at healthcare facilities is low due to fears of neglect and mistreatment by healthcare providers, remote access to the facilities, other difficulties accessing healthcare facilities, and untrained healthcare providers. Similarly, in Nigeria, while nurses/midwives knowledge about maternal nutrition is good overall, the quantity and quality of nutrition education provided by two-fifths of healthcare facilities are inadequate (Ibikunle et al., 2021).

The quality and quantity of ANC are influenced by the education and knowledge of pregnant women and the quality of ANC services provided by healthcare providers. Research conducted at five hospitals in Naples, Italy, showed that only 42% of pregnant women knew the main pregnancy risk factors. Pregnant women admitted receiving little information during gynecological examinations, and as a result, an interesting finding was that 74.8% stopped drinking alcohol during pregnancy. This indicates that knowledge alone cannot change behavior, but other factors, such as support from healthcare providers and husbands, also play a significant role. Therefore, increasing the number of ANC visits must be accompanied by investment in human and material resources to ensure better quality ANC (Solnes Miltenburg et al., 2017).

The relationship between healthcare facility accessibility and 10 ANC services

The research findings show a significant difference in the average accessibility between groups with distant and nearby access to cities. This means that urban residents tend to receive better 10 ANC services. Several studies have found that distance to healthcare facilities contributes to low healthcare service coverage, including services for pregnant and delivering women (Anastasi et al., 2015; Zile et al., 2019).

According to Government Regulation Number 47 of 2016, healthcare facilities are tools and/or places utilized to carry out various efforts in healthcare services, both preventive, promotive, curative, and rehabilitative, conducted by the central government, regional governments, and/or the community. To support the provision of healthcare services to the community, Posyandu (Integrated Service Posts) was established. Posyandu is formed based on the Minister of Home Affairs Regulation Number 19 of 2011 and is one form of Community-Based Health Efforts managed by, for, and with the community to empower the community and provide ease of access to essential healthcare services.

The utilization of healthcare facilities in rural areas is still lower compared to urban areas. The implementation of ANC by applying the 10 ANC Services is almost entirely carried out in Posyandu, so in terms of healthcare facility accessibility, there is no considerable issue. However, further exploration is needed to determine the motivation of pregnant women and families to visit Posyandu for ANC. In various regions of Indonesia, the limited accessibility of healthcare facilities affects ANC attendance rates (Adriana et al., 2014; Mutia & Hadi, 2023; Harahap et al., 2022; Qomar et al., 2021). Similar situations are observed in several countries regarding the utilization of healthcare facilities by urban and rural populations. A survey conducted in several states in the United States stated that the need for healthcare services in rural areas is higher. However, the utilization rate is lower, indicating that rural populations are less confident in accessing healthcare services (Ormond et al., 2000). Research in the Federation of Bosnia and Herzegovina (FBiH) reported a significant difference in the overall assessment of healthcare services between rural and urban populations (Spasojevic et al., 2015).

CONCLUSION

None of the pregnant women received all 10 ANC services completely, while almost all pregnant women (>90%) received blood pressure examinations, counseling, and referral services. However, the 10 ANC service least commonly

received (<50%) was the provision of iron supplementation tablets.

Moreover, there is a significant difference in the average access based on the three clusters (urban, near-distance rural, and far-distance rural). The significantly different groups are the urban with far-distance rural and the urban with near-distance rural. Also, there is a relationship between the knowledge of midwives and the implementation of 10 ANC services, but the strength of the relationship is weak.

All pregnant women must meet the minimum standard of Antenatal Care (ANC). Findings from this study indicate that records in the Maternal and Child Health (MCH) Booklet in North Lampung show that the minimum ANC standard, represented by the 10 Antenatal Care (10 ANC) services, is not being met. Therefore, efforts are needed from the health department to optimize the use of the MCH Booklet in monitoring the implementation of 10 ANC services for pregnant women. It is also essential to conduct periodic follow-ups on quarterly reports on achieving the minimum MCH services standards.

There is a need to enhance MCH services with extended coverage to ensure the achievement of the minimum standard of MCH services (10 ANC). It is essential to refresh the knowledge and skills of midwives in providing 10 ANC services and optimize the completion of MCH Booklets to improve communication among healthcare providers and between healthcare providers and clients.

REFERENCES

- Adriana, N., Wulandari, L. P. L., & Duarsa, D. P. (2014). Akses Pelayanan Kesehatan Berhubungan dengan Pemanfaatan Fasilitas Persalinan yang Memadai di PHCs Kawangu, Kabupaten Sumba Timur. *Public Health and Preventive Medicine Archive*, 2(2), 135–139. <https://doi.org/10.15562/phpma.v2i2.140>
- Anastasi, E., Borchert, M., Campbell, O. M. R., Sondorp, E., Kaducu, F., Hill, O., Okeng, D., Odong, V. N., & Lange, I. L. (2015). Losing women along the path to safe motherhood: why is there such a gap between women's use of antenatal care and skilled birth attendance? A mixed methods study in northern Uganda. *BMC Pregnancy and Childbirth*, 15(1), 287. <https://doi.org/10.1186/s12884-015-0695-9>
- Arifin, A. (2017). *Studi Evaluasi Pengembangan Buku MCH di Propinsi Jawa Tengah*. Project Report. Pusat Penelitian dan Pengembangan Pelayanan dan Teknologi Kesehatan.
- Ashworth, D. C., Maule, S. P., Stewart, F., Nathan, H. L., Shennan, A. H., & Chappell, L. C. (2020). Setting and techniques for monitoring blood pressure during pregnancy. *Cochrane Database of Systematic Reviews*, 2020(8). <https://doi.org/10.1002/14651858.CD012739.pub2>
- Bakhtiar, R., Muladi, Y., Tamaya, A., Utari, A., Yuliana, R., & Ariyanti, W. (2021). Hubungan Pengetahuan Dan Kepatuhan Ibu Hamil Anemia Dalam Mengonsumsi Tablet Tambah Darah di Wilayah Kerja PHCs Lempake Kota Samarinda. *J. Ked. Mulawarman*, 8(3).

- Bello, N. A., Woolley, J. J., Cleary, K. L., Falzon, L., Alpert, B. S., Oparil, S., Cutter, G., Wapner, R., Muntner, P., Tita, A. T., & Shimbo, D. (2018). Accuracy of Blood Pressure Measurement Devices in Pregnancy. *Hypertension*, 71(2), 326–335. <https://doi.org/10.1161/HYPERTENSION.AHA.117.10295>
- Carl I. Fertman, Diane De Muth, & Allensworth. (2017). *Health promotion programs : from theory to practice* (D. D. A. Carl I. Fertman, Ed.). Jossey Bass.
- Ducarme, G., Seguro, E., Chesnoy, V., Davitian, C., & Luton, D. (2012). Estimation clinique du poids fœtal et hauteur utérine dans le dépistage de l'hypotrophie fœtale à terme. *Gynécologie Obstétrique & Fertilité*, 40(11), 642–646. <https://doi.org/10.1016/j.gyobfe.2012.09.002>
- Eloranta, A.-M., Gunnarsdóttir, I., Thorisdóttir, B., Gunnlaugsson, G., Birgisdóttir, B. E., Thorsdóttir, I., & Einarsdóttir, K. (2023). The combined effect of pre-pregnancy body mass index and gestational weight gain on the risk of pre-labour and intrapartum caesarean section-The ICE-MCH study. *PLOS ONE*, 18(1), e0280060. <https://doi.org/10.1371/journal.pone.0280060>
- Fauvel, J.-P. (2016). Hypertensions et grossesse: aspects épidémiologiques, définition. *La Presse Médicale*, 45(7–8), 618–621. <https://doi.org/10.1016/j.lpm.2016.05.015>
- Girotra, S., Malik, M., Roy, S., & Basu, S. (2023). Utilization and determinants of adequate quality antenatal care services in India: evidence from the National Family Health Survey (NFHS-5) (2019-21). *BMC Pregnancy and Childbirth*, 23(1), 800. <https://doi.org/10.1186/s12884-023-06117-z>
- Harahap, M. B., Suroyo, R. B., & Safitri, M. E. (2022). Analisis Faktor Yang Memengaruhi Pemeriksaan ANC Pada Ibu Hamil Di Wilayah PHCs Alai Kota Padang Tahun 2021. *MIRACLE Journal*, 2(1), 138–147. <https://doi.org/10.51771/mj.v2i1.246>
- Hikita, N., Haruna, M., Matsuzaki, M., Shiraiishi, M., Takehara, K., Dagvadorj, A., Sumya, N., Bavuusuren, B., Baljinnyam, P., Ota, E., & Mori, R. (2018). Utilisation of maternal and child health handbook in Mongolia: A cross-sectional study. *Health Education Journal*, 77(4), 458–469. <https://doi.org/10.1177/0017896917753649>
- Horoba, K., Wrobel, J., Jezewski, J., Kupka, T., Roj, D., & Jezewski, M. (2016). Automated detection of uterine contractions in tocography signals Comparison of algorithms. *Biocybernetics and Biomedical Engineering*, 36(4), 610–618. <https://doi.org/10.1016/j.bbe.2016.08.005>
- Hutcheon, J. A., Lisonkova, S., & Joseph, K. S. (2011). Epidemiology of pre-eclampsia and the other hypertensive disorders of pregnancy. *Best Practice & Research Clinical Obstetrics & Gynaecology*, 25(4), 391–403. <https://doi.org/10.1016/j.bpobgyn.2011.01.006>
- Ibikunle, H. A., Okafor, I. P., & Adejimi, A. A. (2021). Pre-natal nutrition education: Health care providers' knowledge and quality of services in primary health care centres in Lagos, Nigeria. *PLOS ONE*, 16(11), e0259237. <https://doi.org/10.1371/journal.pone.0259237>
- Japan International Cooperation Agency. (2022). *Knowledge Sharing Program on Maternal and Child Health Handbook*. Bogor.
- Kording, F., Schoennagel, B., Lund, G., Ueberle, F., Jung, C., Adam, G., & Yamamura, J. (2015). Doppler ultrasound compared with electrocardiogram and pulse oximetry cardiac triggering: A pilot study. *Magnetic Resonance in Medicine*, 74(5), 1257–1265. <https://doi.org/10.1002/mrm.25502>
- Kpewou, D. E., Poirot, E., Berger, J., Som, S. V., Laillou, A., Belayneh, S. N., & Wieringa, F. T. (2020). Maternal mid-upper arm circumference during pregnancy and linear growth among Cambodian infants during the first months of life. *Maternal & Child Nutrition*, 16(S2). <https://doi.org/10.1111/mcn.12951>
- Kupka, T., Matonia, A., Jezewski, M., Jezewski, J., Horoba, K., Wrobel, J., Czabanski, R., & Martinek, R. (2020). New Method for Beat-to-Beat Fetal Heart Rate Measurement Using Doppler Ultrasound Signal. *Sensors*, 20(15), 4079. <https://doi.org/10.3390/s20154079>
- Kusumastuti, E. (2022, August 5). *Anemia dalam Kehamilan*. Direktorat Jenderal Pelayanan Kesehatan Kemenkes.
- Lampung Provincial Health Office. (2023). *Profil Kesehatan Provinsi Lampung*. Lampung.
- Mack, L. R., & Tomich, P. G. (2017). Gestational Diabetes. *Obstetrics and Gynecology Clinics of North America*, 44(2), 207–217. <https://doi.org/10.1016/j.ogc.2017.02.002>
- Manithip, C., Edin, K., Sihavong, A., Wahlström, R., & Wessel, H. (2013). Poor quality of antenatal care services-Is lack of competence and support the reason? An observational and interview study in rural areas of Lao PDR. *Midwifery*, 29(3), 195–202.

- <https://doi.org/10.1016/j.midw.2011.12.010>
- Mariyam, S., & Muslimah, A. E. (2018). Analisis Riwayat Tablet Tambah Darah Pada Ibu Hamil Dengan Anemia Di Indonesia (Data Riskesdas 2018). *Kebidanan*, 10(2), 1-8. <https://journal.unita.ac.id/index.php/bidan/article/view/404>
- Mikrajab Muhammad Agus, & Rachmawati Tety. (2016). Analisis Kebijakan Implementasi Antenatal Care Terpadu PHCs Di Kota Blitar. *Buletin Penelitian Sistem Kesehatan*, 19(1), 41–53.
- Mutia, F., & Hadi, A. J. (2023). Faktor yang Berpengaruh dengan Perilaku Pemeriksaan ANC Ibu Hamil di Wilayah Kerja Puskesmas Batangtoru Kabupaten Tapanuli Selatan. *Media Publikasi Promosi Kesehatan Indonesia (MPPKI)*, 6(9), 1887-1897.
- Mutiara, E. S., Manalu, L., Klise, R. E., Aginta, S., Aini, F., & Rusmalawaty, R. (2023). Analisis Pemberian Tablet Tambah Darah pada Ibu Hamil di PHCs: Studi Literature Review. *MEDIA KESEHATAN MASYARAKAT INDONESIA*, 22(2), 125–135. <https://doi.org/10.14710/mkmi.22.2.125-135>
- National Institute for Health and Care Excellence. (2019). *Hypertension in pregnancy: diagnosis and management*. National Institute for Health and Care Excellence (NICE).
- North Lampung Health Office. (2022). *Profil Kesehatan Lampung Selatan*. Lampung.
- Ormond, B. A., Zuckerman, S., & Lhila, A. (2000). *Assessing the New Federalism, an Urban Institute Program to Assess Changing Social Policies*. Washington DC. <https://eric.ed.gov/?id=ED441909>
- Pay, A. S. D., Wiik, J., Backe, B., Jacobsson, B., Strandell, A., & Klovning, A. (2015). Symphysis-fundus height measurement to predict small-for-gestational-age status at birth: a systematic review. *BMC Pregnancy and Childbirth*, 15, 1-9. <https://doi.org/10.1186/s12884-015-0461-z>
- Ministry of Health RI. (2019). *Permenkes No 4 Tahun 2019 Tentang Standar Teknis Pemenuhan Mutu Pelayanan Dasar Pada Standar Pelayanan Minimal Bidang Kesehatan*. Jakarta.
- Qomar, U. L., Na'mah, L. U., & Yelvin, B. K. D. V. W. (2021). Hubungan Paritas, Umur Dan Usia Kehamilan Dengan Jarak Kunjungan Antenatal Care Trimester III Di Masa Pandemi Covid 19 Di PMB Brida Kitty Dinarum Vwy. *Jurnal Ilmiah Kesehatan Keperawatan*, 16(2).
- Redaksi Mediakom. (2024). *Agar Ibu dan Bayi Selamat*. Jakarta: Kementerian Kesehatan Republik Indonesia. <https://sehatnegeriku.kemkes.go.id/baca/blog/20240125/3944849/agar-ibu-dan-bayi-selamat/>
- Schiff, E., Friedman, S. A., Kao, L., & Sibai, B. M. (1995). The importance of urinary protein excretion during conservative management of severe pre-eclampsia. *American Journal of Obstetrics and Gynecology*, 172(1), 375. [https://doi.org/10.1016/0002-9378\(95\)91106-5](https://doi.org/10.1016/0002-9378(95)91106-5)
- Shivaprasad, C. (2011). Sheehan's syndrome: Newer advances. *Indian Journal of Endocrinology and Metabolism*, 15(7), 203. <https://doi.org/10.4103/2230-8210.84869>
- Solnes Miltenburg, A., van der Eem, L., Nyanza, E. C., van Pelt, S., Ndaki, P., Basinda, N., & Sundby, J. (2017). Antenatal care and opportunities for quality improvement of service provision in resource-limited settings: A mixed methods study. *PLOS ONE*, 12(12), e0188279. <https://doi.org/10.1371/journal.pone.0188279>
- Spasojevic, N., Vasilj, I., Hrabac, B., & Celik, D. (2015). Rural-Urban Differences in Health Care Quality Assessment. *Materia Socio Medica*, 27(6), 409. <https://doi.org/10.5455/msm.2015.27.409-411>
- Supiana, N. (2021). Implementasi 10ANC dalam Pencegahan Komplikasi Kehamilan dan Persalinan di PHCs Ampenan. *Jurnal Ilmu Kesehatan Dan Farmasi*, 9(2), 19–24. <https://doi.org/10.51673/jikf.v9i2.873>
- Ulfa, I. M., Suhartati, S., & Anisa, N. F. (2021). Evaluasi Pemanfaatan Buku MCH Oleh Ibu Hamil Di Kecamatan Banjarmasin Timur. *Dinamika Kesehatan, Jurnal Kebidanan Dan Keperawatan*, 12(1), 81–96.
- World Health Organization. (2024). *Kematian Ibu*. <https://www.who.int/news-room/fact-sheets/detail/maternal-mortality>.
- Yang, Y.-Y., Fang, Y.-H., Wang, X., Zhang, Y., Liu, X.-J., & Yin, Z.-Z. (2018). A retrospective cohort study of risk factors and pregnancy outcomes in 14,014 Chinese pregnant women. *Medicine*, 97(33), e11748. <https://doi.org/10.1097/MD.00000000000011748>
- Zile, I., Rezeberga, D., Lazdane, G., & Gavare, I. (2019). Comparison of antenatal care factors and pregnancy outcome in rural and urban context. *SHS Web of Conferences* (Vol. 68). EDP Sciences. <https://doi.org/10.1051/shsconf/20196802007>